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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,290	07/10/2003	Ralph H. Johnson	H26341-D1 US	2653

22913 7590 12/30/2005

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EXAMINER	
MENEFEE, JAMES A	

ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 12/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/617,290	JOHNSON ET AL.	
	Examiner	Art Unit	
	James A. Menefee	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *32-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *38-45* is/are allowed.

6)☒ Claim(s) *32-37 and 46-52* is/are rejected.

7)☒ Claim(s) *53* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9/22/03(2); 9/29/03; 2/9/04; 10/4/05
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In response to the amendment filed 10/4/2005, the abstract and claims 32-38, 44, 46, and 53 are amended. Claims 32-53 are pending.

Information Disclosure Statement

Applicant requests consideration of all of the Information Disclosure Statements. The record now includes four information disclosure statements: filed 9/22/2003 (1 page new; 13 pages of references from the parent case); filed 9/29/2003 (1 page); filed 2/9/2004 (1 page); filed 10/4/2005 (copies of the prior IDS's).

The IDS's filed 9/29/2003, 2/9/2004, and the 1 page new filed 9/22/2003 were previously considered by the examiner. See the attached copies that were sent with the prior action. The 13 page IDS filed 9/22/2003 of references from the parent case was inadvertently omitted by the examiner; this IDS is signed and considered as on the attached copy. The IDS filed 10/4/2005 consisting of copies of the prior IDS's has been considered; all of the references are crossed out because they are considered on other signed IDS's. All of the IDS's are now believed to be considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 32-37 and 46-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cox (US 5,812,581; see Fig. 6 and the discussion thereof unless otherwise noted) in view of Choquette et al. (US 5,493,577), and further in view of Lear (US 5,633,527).

Regarding claim 32, Cox discloses a device comprising a substrate S, a first DBR BM formed on the substrate, an active region A formed over the first DBR, and a second DBR TM formed over the active region, the second DBR comprising a first DBR mirror layer (below the section 60) and a second DBR mirror layer (at the section 60) having an insulating layer 60 defining an aperture (the portion between the sections 60 will be an aperture) and an isolation implant region 62 extending around an spaced outwardly from the perimeter of the aperture and traversing through the insulating layer and at least some of the DBR layers (indeed it goes through all of top mirror TM).

While Cox does not explicitly refer to the mirrors as DBRs, Cox refers to the mirrors, for example TM, as comprising a plurality of layers and with a structure as described in the cited patents in the background of the invention. See col. 6 lines 40-46. Several patents describe such mirrors as DBRs.

It is not disclosed that the second DBR mirror layer has a doping level higher than that of the first DBR mirror layer.

Cox's insulating layer is ion implanted. However, Choquette teaches that such ion implanted layers may be advantageously replaced by an oxidized insulating layer 20. It would have been obvious to one skilled in the art to use an oxidized layer as in Choquette, rather than the ion implanted layer of Cox, because this improves device characteristics such as threshold

current density. See Choquette col. 19 lines 8-21. As the layer is oxidized, it is necessarily insulating.

Cox's second DBR may be p-type. Col. 6 lines 47-48. Lear teaches that oxidation extent is dependent on dopant level, and that a higher doping level yields more oxidation. See col. 7 lines 44-59. Since the second DBR layer is where the oxidation occurs, it would have been obvious to one skilled in the art to make that layer higher in dopant level as a means for controlling the oxidation extent of such a layer, as taught by Lear; since that is the only layer that is supposed to be oxidized, it would have been higher doped in order to facilitate such oxidation.

Regarding claim 33, the second DBR mirror layer is over the first as described above.

Regarding claim 34, the isolation implant region 62 extends entirely around the perimeter of the aperture formed by insulating layer 60.

Regarding claims 35-36, the isolation implant region 62 defines an aperture larger than and substantially coaxial with the insulating layer aperture. The layers of the present invention described as isotropic are typical DBR layers, and thus it may be presumed inherent that Cox's DBR layers are also isotropic.

Regarding claim 37, the isolation implant region is implanted with hydrogen ions, therefore protons. Col. 7 lines 62-63.

Regarding claims 46 and 49-52, these claims are merely methods comprising the steps of forming the devices as claimed in the above claims, and therefore are rejected for the same reasons.

Regarding claims 47-48, the isolation implant region extends through the active layer and into the lower mirror.

Allowable Subject Matter

Claims 38-45 are allowed. Claim 53 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

There is not taught or disclosed in the prior art a VCSEL (or an optoelectronic device having an active mirror between first and second mirrors) including an isolation impant region as claimed and a heat conduction layer between the mirrors that is periodically doped to maximize doping at the electric field minima of the device.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. The new grounds of rejection were necessitated by applicant's amendments, therefore this action is made final.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (571) 272-1944. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James Menefee
December 22, 2005